ORIGINAL

EX PARTE OR LATE FILED

WILEY, REIN & FIELDING

1776 K STREET, N.W.
WASHINGTON, D.C. 20006
(202) 429-7000

THOMAS S. DOMBROWSKY, JR.
(202) 719-7236
TDOMBROW@WRF.COM

FACSIMILE
(202) 719-7049

January 22, 1999

Ms. Magalie Roman Salas
Office of the Secretary
Federal Communications Commission
445 12th Street, SW
12th Street Lobby, TW-A325
Washington, DC 20554

RECEIVED

JAN 22 1999

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Re: Notification of *Ex Parte* Contact in ET Docket No. 98-206

Dear Ms. Salas:

On Thursday, January 21, 1999, Northpoint Technology ("Northpoint") and its representatives met with members of the Wireless Telecommunications Bureau to discuss experimental test results of Northpoint. Representing Northpoint were Sophia Collier, Catherine Reynolds, Mitchell Johnson of Northpoint, and Tom Dombrowsky of Wiley, Rein & Fielding. The Wireless Bureau was represented by David Wye, Tom Stanley, Ron Netro, and Michael Pollak.

The purpose of the discussion was to discuss experimental test findings concerning Northpoint's experimental license (FCC call sign WA2XMY). A handout was provided that has been included as an attachment hereto.

Should any questions arise concerning this *ex parte* notification, please contact the undersigned at (202) 719-7236.

Sincerely,

Thomas S. Dombrowsky Jr.

Thomas S. Dombrowsky, Jr.
Engineering Advisor

No. of Copies rec'd 0+1
List ABCDE

Enclosures: Handout concerning experimental test results

cc: David Wye
Tom Stanley
Ron Netro
Mike Pollak

Northpoint Technology Urban Test Report Summary

Background

On July 8, 1997, Diversified Communication Engineering, Inc. (DCE) was granted by the FCC an experimental license, call sign WA2XMY, to conduct tests in â rural environment in Kingsville, TX, to investigate and validate the Northpoint technology and its compatibility with the Direct Broadcast Satellite (DBS) service. On July 20, 1998, an extension of the original experimental license was granted to continue to test in Kingsville, as well as to perform tests in an urban environment in Austin, TX.

The Northpoint (NP) technology[1] concept provides a means to broadcast terrestrial signals for a local market in the presence of, and co-frequency with, DBS signals, without interfering with either service. The concept for co-existence of the two services is partially based on the high degree of spatial selectivity of the DBS receiving antennas as well as other factors incorporated into the NP technology concept.

Current Testing Builds on Successful Work in 1997

Initial field tests of the Northpoint technology were conducted in 1997 on the King Ranch near Kingsville, Texas, as described in the previous Progress Report – WA2XMY, Submitted on January 8, 1998[2]. The main purpose of that initial field test was to verify the basic Northpoint concept and to establish an appropriate NP transmitter power level for optimal coverage of a reasonable service area cell, while producing minimal or zero interference to the DBS service in the immediate vicinity of the transmitter. This small region near the transmitter is known as a 'Mitigation Zone' and is defined as the area in which special mitigation measures might be needed to avoid interference with DBS users within the zone. The King Ranch tests served to confirm the theoretical expectation of NP-DBS compatibility.

Urban Area Testing Demonstrates Practicality of System

Field tests were conducted in Austin, TX, during December 1998. The Northpoint terrestrial transmitter (NP-Tx) was located on the DCE headquarters building in downtown Austin. The test area contained a variety of environmental conditions, ranging from high-rise buildings in the downtown area to residential neighborhoods with varied terrain and foliation. Weather conditions during testing also were varied, ranging from clear sky to severe rain, providing the fortunate opportunity to gather test data under adverse conditions.

The work done in this phase of our experimental work has greatly expanded our field

---

[1] US Patents No. 5,483,663 (9 Jan 1996) and No. 5,761,605 (2 Jun. 1998) – by Saleem Tawil and Carmen Tawil of DCE, Austin, TX.

[2] Experimental Testing Report – 1997 Kingsville Tests, 'Progress Report – KA2XMY', Submitted by DCE, Inc., On Behalf of Northpoint Technology, to FCC Experimental Licensing Branch, Jan. 8, 1998.

knowledge of the workings of the Northpoint system and demonstrated that the system works well in an urban area. With this test we have documented that multi-pathing, an issue previously raised as a concern, is not a problem for the Northpoint system. Furthermore, we have demonstrated that under line-of-site conditions, a good quality Northpoint signal could be obtained at almost 14 miles, which would equate to a service area of 190 square miles.

Also of special note during this test was the fact that no beam-tilting or other mitigation techniques were required to achieve the positive results report herein.

Test Goals

Test objectives included the following, among others:

(a) To observe the DBS satellite signals DirecTV (DTV) and Echostar (ES) and the Northpoint (NP) signal at several sites and various site conditions within the test service area, to determine the signal strengths and to assess the presence and extent of any Northpoint interference into the DBS signals. To include test sites which appear to present extreme or worst case interference conditions;

(b) To examine the nature and extent of the Mitigation Zone for this test environment and to consider some effective remedies if required;

(c) To investigate effects of multi-path propagation due to reflections from buildings and other structures that are prevalent in certain portions of the test area;

(d) To explore the service area range for this test environment, with a sampling of intermediate and far-range measurement sites, and to observe effects of terrain and foliage;

(e) To examine the nature of the Northpoint signal in regions outside of the main NP-Tx antenna beam, to the side and to the north of the antenna;

(f) To conduct special tests to help clarify various questions regarding signal propagation and interference mechanisms, as deemed necessary and feasible. Such tests included experiments to determine various DBS channel programming parameters needed for the test work; and signal reflection and shielding experiments.

Detailed Test Plan Prepared with DBS Industry Input

The tests were conducted in general accordance with the NP-DBS Compatibility Testing Plan – Phase I Draft[3], with the exception of a few minor procedural changes. This Test Plan was provided on request to both DirecTV and United States Satellite Broadcasting

[3] Northpoint Technology – 'DBS Compatibility Experimental Testing Plan – Phase I Draft', Submitted by Diversified Communication Engineering, Inc., On Behalf of Northpoint Technology, Nov. 5, 1998.

(USSB), whose input was incorporated into the final draft.

Public notice of the field work, test period and contact information were published by DCE in the local newspaper, with copies sent to all DBS licensees via certified mail, as required, prior to start of the project. The field work was done during the calendar period from the 4th through the 31st of December 1998. During the first portion of this period, considerable effort was devoted to equipment calibration and general procedure refinements, and to special experiments related to all aspects of the test objectives. These experiments included reception and assessment of the DBS satellite signals in the presence of the NP transmissions; reflection and multi-path tests; tests with signal obstructions; and tests of intermediate and far range reception of the NP signals. Interference tests focused initially on sites in the Mitigation Zone and at predicted maximum interference regions for the DirecTV and Echostar satellites as determined by the DeLawder study[4], where conditions of signal strengths and antenna pointing directions are most favorable to interference by the NP signal.

Error Rate Testing Done with Consumer Set Top Box to Assess Real World Impact

All parties interested in these tests have desired the use of means to assess the degree of DBS interference in a quantitative manner by measurement of the signal error rate or an equivalent parameter. However, certain proprietary information and special hardware needed to make an actual error rate measurement has not yet been made available to NP from the DBS service suppliers. During this initial test period, an alternate error assessment was first suggested by USSB personnel, based on the DBS software 'signal strength pointer' (ssp) that is provided for use in peaking the DBS antenna. Such an approach was implemented based on information from DirecTV personnel on the general nature of the relationship of this ssp feature to error rate and based on some related field experiments. This works is quite valuable because it provides a basis for determining what impact, if any, NP's operations will actually have on consumers under real world conditions.

Test Procedure and Results

Close Range and Mitigation Zone Areas

Great Attention Was Paid To the Areas Closest To The Northpoint Transmitter

The region of greatest interest during the test was the area closest to the transmitter. It is this region where the Northpoint signal is the strongest and therefore is the area that has the greatest theoretical risk of interference to the DBS signal.

[4] DeLawder Communications , Inc., Engineering Report, 'Austin Testing Technical Annexes', Submitted by DCE, Inc., On Behalf of Northpoint Technology, to the FCC, June, 1998.

Numerous sites were tested in close proximity to the NP transmitter, in order to examine the interference issues related to the stronger NP signal and the prospects for reflections and multi-path conditions due to the presence of large buildings and other structures. Of the near range sites tested, the ones of concern here are Sites 1, 3, 4, 5, 6, 7, 8, 9, and 10, located south of the river from the NP transmitter. These site locations are shown in the attached Site Map, and they are also identified in the aerial photos.

Field Data Confirmed Theoretical Predictions

These sites show a small depression in the ssp values (decreased pdix), except for Sites 5, 6, 8, and 10, all of which show a decreased level of NP signal strength. For Sites 5, 6, and 8, the NP transmitter is obstructed by buildings, causing a smaller signal; and Site 10 is both further away and is positioned such that the NP signal passes through a dense grove of trees. Thus, the data makes sense in terms of the theoretical expectations. The NP influence is relatively small in every case, as judged by the ssp data and the fact that the DBS signal integrity is good at all sites. At no time did the NP signal cause the ssp of the DBS receiver to fall below the suggested value of 60.

One issue of primary importance in the tests is the nature of two maximum interference potential (MIP) regions that were identified by the DeLawder study (referenced earlier), one for each of the two related DBS services. Site 3 was placed in the MIP region for DirecTV and Site 4 was placed in the MIP region for Echostar. All signals were of good integrity at both sites, with no apparent problems. Some depression could be observed in the ssp values, as expected. The following table suggests a correlation with the theoretical MIP zones:

Pointer Depression Index Values (pdix)

Site	DirecTV	Echostar
3	0.83	0.99
4	0.93	0.91

In both cases, the NP effect is small, and did not impact the ability to receive a good quality signal. In both cases the impact was not sufficient to lower the signal strength pointer below the value of 60 recommended for everyday operation by the direct broadcast industry.

Good DBS Signal Integrity Observed Close to Northpoint Transmitter

Site 1 (Hyatt) has the strongest NP received signal level of all sites as expected since it is closest to the transmitter. It shows a pdix value of 0.85 for DirecTV, which indicates less NP influence than for Site 3. This result is as predicted since Site 1 is not located within the DirecTV MIP, while Site 3 is.

Site 20 was placed in a position such that the NP-Tx antenna was completely hidden by buildings, yet a usable NP signal was obtained, while no interference was observed at all. In this case, the NP signal was acquired from building reflections in the vicinity of the NP-Tx, a mechanism that can be positive and useful for NP reception in downtown areas.

Of the four sites placed to the NW of the NP transmitter, there was no significant indication of error rate influence by NP on the DBS signals, while at the same time, a useable NP signal was acquired.

From most of these near range sites, reflections could be observed from surrounding buildings and other structures. No ill effects appeared to arise from any of the reflections.

Some special experiments on this topic will be discussed in Section C.

In summary regarding the near range sites, the various behaviors were as predicted. Evidence of NP-DBS error rate influence is apparently small and if interference were to affect a close-in user it can be essentially eliminated by simple measures.

Multi-path and Reflection Tests

Some special experiments were conducted in the near range site region to examine the nature and possible influence of NP signal reflections from buildings and other structures in the site vicinity. Sites used are again Sites 1, 3, 4, 5, 6, 7, 8, 9, and 10. These sites are shown in Figure II-2 and the same aerial photo figures as listed earlier, and Photo 1 of Figure IV-P1 is of particular focus in this discussion.

Although one or more reflections were observed at most of the near range sites by intentionally scanning with the DBS antenna, they were usually small and there was no observed negative influence that could be attributed to them. It was desired to identify some reflection conditions that were more severe and that could be considered close to worst case in the area.

In an initial part of this experiment, it was decided to first begin at Site 3 (Palmer) and drive the instrument van slowly to the NW across the Palmer parking lot (along the yellow line in Photo 1), while an operator continuously scanned for any possible reflections. In doing this, the antenna operator scanned especially for reflections from Palmer Auditorium and from all surrounding buildings. Nothing of significance was found in this test.

No Negative Impact on Northpoint Signals from Multi-Path Effects

It was then decided to seek possible reflections from specific buildings by strictly geometric predictions of where they would be and position the test site to observe them. This turned out to be relatively easy for the buildings to the south of the Palmer parking lot, because the north faces contained glass panes in which the NP transmitter site could be seen when standing in the appropriate ray path. Test sites 7, 8, 9, and 10 were established in optimal places from which to get an NP reflection from these two buildings. For reference, the reflection buildings are the City of Austin Electric Dept. (COA), just south of Sites 7 and 8, and the office building 811 Barton Springs Road – (OB811), just south of Site 9. Site 7 receives a reflection from the north face of the east wing of the COA building, and Site 7 is positioned to receive a reflection from the large glass covered central portion of the north building face, through trees at the front of the building. Site 9 is positioned for a reflection from OB811, east wing, through trees, and Site 6 is aligned for a reflection from the west wing of OB811, with a greater reflecting surface available.

Full site data acquisition was done at each of these sites, and in addition, the reflection data was observed and recorded, and a spectral plot (SA screen copy) was obtained. Associated reflection spectral plots are included in the Receiver Site Logs with the associated site data.

The following table summarizes the reflection data observed for these four sites, where Px(N) is for the direct path reading, and Px(R) is for the reflection path:

Site No.	Px(N)	Px(R)	Px(N)-Px(R) dBm	Comments
7	-34.6	-41.3	+ 6.7	Brick and Glass.
8	-58.2	-52.6	- 5.6	NP behind Palmer.
9	-38.8	-53.3	+14.3	Ant 15' AGL - better Px(N)
9A	-59.4	-46.1	-13.3	Ant 4' AGL
6	-53.7	-57.6	+ 3.9	NP obstructed.

In Photo 1, one can visually tract the reflection paths and the other geometrical aspects of the problem, including the nature of the NP direct path, as well.

Clearly, in two of these cases, the reflected signal was larger than the NP direct signal. A perfectly good NP TV signal was of course found to be available via the reflection, as well as for the direct NP signal in all cases.

DBS Not Hurt by Northpoint Multi-Path Signals

As an important observation in this test, there was no discernible evidence of any ill influence due to the strong reflections to either the DBS signals or the NP signal.

A similar test was later conducted at Site 10 on the TXDOT parking lot, also visible in Photo 1. In this case, the NP reflection is from the north face of the building, which is about 50 to 70 percent glass. The direct NP signal is seen through a fairly dense grove of trees along the north side of the parking lot. The readings are as follows:

Px(N)	Px(R)	Px(N)-Px(R) dBm

Site 10	-61.3	-52.2	-9.1

The reflected signal is larger in this case, too. The DBS and NP signals were good, and there was no detectable negative influence from the reflection.

As another pertinent observation, the large reflections in these tests were all directed toward the front side of the DBS antennas (although not along the bore sight), and there was no ill effect seen. From the test experiences, it appears to be likely that the reflected signals of significant energy are normally fairly well defined (as opposed to highly diffuse and scattered), and there is only a very small probability that a reflected signal of importance would enter the DBS antenna from an angle within the main beam. If it did, then only small changes in the DBS antenna placement would likely solve the problem. It is suggested that the multi-reflected and scattered signals that might be more prevalent in the propagation angle are usually very attenuated and not likely to be of importance. It is recognized that there could be exceptions to this described condition, but none were found during this test. From the experiences in this project thus far, the exceptions are likely to be rare.

Tree Obstruction Tests

Sites 11 and 12 were placed for the purpose of investigating the NP reception in areas where trees are prevalent. These sites are shown on the Site Map of Figure II-2, and the Site 12 is also shown in the aerial photo 6 of Figure IV-P6. The area is a wooded residential neighborhood located to the south by a mile or so. For ground to rooftop heights, the NP signal is seen through trees in many places. For these test sites, the DBS antenna (receiving NP) was optimally positioned to receive the NP signal through the trees. The NP and DBS signals were all good.

Wooded Areas Can Be Served by Northpoint Signals

The observations from this experiment are basically that NP reception in wooded areas is feasible when the NP transmitter is at least partially visible through the foliage. At both sites a physical survey was made of the homes surrounding the site and it was determined that within these residential areas it would be straightforward to locate an antenna position for suitable reception.

Intermediate and Far Range Tests

Good Northpoint Signal Present at Almost 14 Miles

Numerous sites were tested at distances between 2 miles to 13.8 miles from the NP transmitter; and although the full signal integrity tests were done on all sites, it quickly became clear that any NP-DBS interaction was no longer detectable at distances beyond 1 to 2 miles. The principal objective for these sites was to examine the feasibility of NP signal reception and to assess the service area size for the prevailing conditions.

No Impact on DBS Signal

The data and results for these sites are tabulated in Figures IV-3 through IV-6. It is clear that the relevant pdix values are all close to unity, suggesting that no DBS signal error influence is present. The DBS satellite signal powers remain virtually the same for all sites, of course, except where physical obstructions exist. The NP signal powers, while showing anticipated variations from place to place, are viable for all sites tested, and a good NP TV signal was obtained at all sites.

Signal Measurements North of NP Transmitter

Sites 22, 23, 24, and 25 were used to sample a region of downtown Austin in the area to the northwest of the NP transmitter. Site 25 is actually in a residential area to the west of the main downtown area. These sites are shown in the Figure IV-2 Site Map and are also visible in some of the aerial photo maps. The purpose for these sites was to examine the NP transmitter signal strength in the area 'behind' the transmitter, where the signal is expected to be lower due to the directional pattern of the transmit antenna. A further objective was to investigate the issues of NP signal reception, multi-pathing and DBS interference in this environment.

No Negative Impact on DBS Reception

The data and results for these sites are tabulated in Figures IV-3 through IV-6. All signals were good, and it is clear form the pdix values in the table that these sites are not affected by NP-DBS interference.

A reflection search was done at Site 22, where a substantial reflection was found from the Bank-One parking garage located to the NE of the site. This building is mainly composed of reflective glass. The measured reflected signal power was Px = -56 dBm, whereas, the direct NP signal power was -48.2 dBm. Other much smaller reflections were observed but not recorded. No problems were found to result from the measured reflection or any others.

Substantial NP signal reflections could be found in most cases, but there was no evidence of any problem resulting from the reflections to either the DBS systems or to the NP system. It is likely that such reflections, when they exist, can be used as an aid to receiving the NP signal in places where the NP transmitter is not visible, while at the same time having no ill effect on the DBS signals.

Field Data Confirm Predicted Values

The direct NP signal power for the four sites, when adjusted for constant range, appears to roughly conform with the azimuth related attenuation of the ideal NP-Tx antenna pattern. Although the NP signal power is reduced in this region, it does appear that the